

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD  
SANTA ANA REGION

March 12, 2004

ITEM: 20

SUBJECT: Overview of the Occurrence of Perchlorate in the Santa Ana Region

DISCUSSION:

Perchlorate has been detected in many municipal water supplies in California and throughout the United States since 1997, when an analytical method was developed that could detect perchlorate in water to a level of 4 parts per billion. Prior to 1997, the detection level for perchlorate was 400 ppb. Perchlorate has been detected in groundwater in 33 states and has become a contaminant of national concern. Perchlorate has been detected in about 330 municipal water supply wells in California. Although the Santa Ana Region comprises less than 2% of the land area of California, 50% of the municipal water supply wells containing perchlorate in California, 167 municipal supply wells, are in the Santa Ana Region. The state drinking water Action Level was originally established as 18 ppb in 1997, and was subsequently lowered to 4 ppb in January 2002.

The source of perchlorate in the municipal supply wells in the Santa Ana Region that contain the highest concentrations of perchlorate has been found to be industrial point sources associated with the aerospace industry and fireworks manufacturing. Perchlorate is formed through the dissolution of perchlorate salts, primarily ammonium perchlorate, sodium perchlorate and potassium perchlorate. Perchlorate salts are primarily used as an oxidizer in solid rocket fuel and other explosive mixtures, but have several other uses as well. The mass production of perchlorate salts began in Nevada in about 1950, and over 90 percent of all the perchlorate salts manufactured in the United States have been used in the manufacture of solid rocket fuel by the Department of Defense or its contractors. Therefore, it is not surprising that the sources of the highest concentrations of perchlorate found in municipal water supply wells in the Santa Ana Region are associated with, or appear to be associated with, aerospace facilities and explosives or fireworks manufacturing facilities. To date, nearly all of staff's effort to investigate perchlorate problems has been focused on industrial facilities in the areas where the highest concentrations of perchlorate have been detected in municipal water supply wells. Board staff has been unable to dedicate appropriate resources to thoroughly evaluate the sources of perchlorate found in other municipal wells throughout the Santa Ana Region. It is possible that industrial point sources may be the source of this perchlorate, although the

historical use of Colorado River water in the Santa Ana Region and the historical use of certain fertilizers have also been suggested as possible sources.

In 1997, perchlorate was found to be present in Colorado River water at concentrations up to 9 ppb. The source of the perchlorate was the perchlorate manufacturing facilities in Nevada adjacent to Las Vegas Wash, which flows into Lake Mead. These facilities, which have recently ceased operation and have relocated to Utah, are currently remediating the perchlorate pollution at their former facilities adjacent to Las Vegas Wash, and are decreasing the flow of perchlorate to the Colorado River. The concentration of perchlorate in Colorado River water currently being delivered to Southern California is about 5 ppb.

The only known naturally occurring source of perchlorate is in nitrate deposits in Chile. Prior to the 1920's, Chilean saltpeter (sodium nitrate) accounted for most of the world's supply of fixed nitrogen. Large quantities of sodium nitrate were exported throughout the world, including to the United States, and constituted the predominant source of nitrogen used in inorganic fertilizers. Perchlorate in sodium nitrate imported from Chile is believed to have been about 0.2%. A small amount of sodium nitrate is still imported from Chile into the United States, but currently represents an insignificant source of nitrogen in fertilizers. Sodium nitrate was a source of nitrogen that was historically used on citrus groves in the Santa Ana Region. Although sodium nitrate would have most likely been used in the Santa Ana Region primarily before the 1930's, the amount used, the locations it was applied and the time periods it was applied is not known. Although the low concentration of perchlorate in Chilean nitrate is believed to be a possible source of perchlorate found in groundwater across the country, it has not yet been clearly determined to be a source anywhere where perchlorate is present in groundwater.

At the Board meeting, staff will provide an overview of the areas in the Santa Ana Region where perchlorate has been detected, and summarize the perchlorate related activities that are occurring in those areas.